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ABSTRACT

The Outward Bound Bridging Course is a 6-week residential program designed to improve academic achievement and self-concepts in low-achieving high school males. During 1980-1984, five courses were conducted for 66 Australian high school males. Most of them were ninth grade students, chosen on the basis of poor academic performance, an apparent potential to perform better, and strong parental support. The design of the evaluation component of this study evolved during the 5-year period. After the first 2 years, standardized mathematics and reading tests, the Self-Esteem Instrument (SEI) and the Self-Description Questionnaire (SDQ) were administered before, during, and after each course. Findings supported: (1) the effectiveness of the Outward Bound Bridging course coupled with parental involvement as an academic intervention for low-achieving high school males on both academic achievement and academic self-concept; and (2) the validity of multidimensional self-concept responses to the Self-Description Questionnaire in relation to academic performance and in relation to the impact of an effective academic intervention. The short multiple time-series design, the specificity of the effects to academic outcomes, and the generality of the effects across academic self-concept and achievement make implausible many possible internal and external threats to the validity of the interpretations. (Author/JAZ)

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The Outward Bound Bridging Course for Low-achieving High School Males: Effect on Academic Achievement and Multidimensional Self-concepts

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Running Head: The Bridging Course

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The Outward Bound Bridging Course for Low-achieving High School Males: Effect on Academic Achievement and Multidimensional Self-concepts

ABSTRACT

The Outward Bound Bridging Course is a six week residential program designed to improve academic achievement and self-concepts in low-achieving high school males. In the period 1980-1984 five courses were conducted for 66 high school males chosen on the basis of poor academic performance, an apparent potential to perform better and strong parental support. The findings provide support for: a) the effectiveness of the Outward Bound Bridging course coupled with parental involvement as an academic intervention for low-achieving high school males on both academic achievement and academic self-concept; and b) the validity of multidimensional self-concept responses to the Self Description Questionnaire in relation to academic performance and in relation to the impact of an effective academic intervention. The short multiple time-series design, the specificity of the effects to academic outcomes, and the generality of the effects across academic self-concept and achievement make implausible many possible internal and external threats to the validity of the interpretations.

The Outward Bound Bridging Course for Low-achieving High School Males: Effect on Academic Achievement and Multidimensional Self-concepts

The Outward Bound Program

Richards (1977) stated that the purpose of Outward Bound courses is to provide a setting for "the person to recognize and understand his own weaknesses, strengths, and resources and thus find within himself the wherewithall to master the difficult and unfamiliar" (1977, p. 69). The Outward Bound standard course is a 26-day residential program for 17-25 year olds that comprises physically and mentally demanding outdoor activities. Marsh, Richards and Barnes (1986; in press; Marsh & Richards, in press) demonstrated that participation in this standard course had a significant effect on the nonacademic dimensions of self-concept most related to the course goals, and produced a more internal locus of control. These findings supported results from an American Outward Bound study by Smith, Gabriel, Schott and Padia (1975) that also used a time-series design to show that the intervention had a positive effect on self-assertion and self-esteem (see Godfrey, 1974; Richards, 1977; Shore, 1977 for reviews of other Outward Bound research).

The Bridging Course was subsequently developed by Outward Bound for low-achieving high school males. Richards (1981, p. 4) states " the aim of the Outward Bound Bridging Course stated in its simplest form was to attempt to produce significant gains in the cognitive domain, especially in language and mathematics, through an integrated programme of remedial teaching, normal schoolwork and experiences likely to influence personality in general and self-concept/self-esteem in particular." The design of the Bridging Course was influenced substantially by McClelland's achievement motivation theory and his practical suggestions about how achievement motivation can be changed (McClelland, 1965). While a detailed discussion of McClelland's research is beyond the scope of this study, several aspects are particularly relevant. He stresses that the first step, even before the start of the program, is to create a belief that the program will work and states: "In short, we were trying to make every possible use of what is sometimes regarded as an "error" in such research -- namely the Hawthorne effect, the experimenter bias, etc., because we believe it to be one of the most powerful sources of change" (p. 324). McClelland conceptualizes motives as learned, affectively toned, associative networks arranged in a hierarchy of importance so that the problem of improving achievement motivation

becomes one of moving it up in the hierarchy by making it more salient. This can be done, according to McClelland, by setting up and conceptualizing the network, tying the network to everyday experiences, and relating it to superordinate motives and beliefs that might interfere with its operation. McClelland stresses that change is more likely if individuals commit themselves to concrete realistic goals and keep records of progress towards the goals; he suggests that at the end of a program participants prepare a specific statement of their own goals for the future to make more concrete the practical implications of the program and to serve as a basis for subsequent evaluation of their progress. The setting of such a program, according to McClelland, should be one where the individual is removed from his/her everyday routine, isolated from the outside world, and made to feel he/she is "warmly but honestly supported and respected by others as a person capable of guiding and directing his own future behavior" (p. 329). Finally, McClelland argues that when participants who share a intensive learning experience come from the same community, they are more likely to form a reference group that will reinforce the changes that have occurred once they return to their old environment.

The Bridging Course is a 6 week residential program where a small group of 11-16 participants -- primarily ninth grade students -- is removed to an isolated environment (except for one weekend when they return home to visit their parents). The learning environment emphasizes high degrees of task orientation and teacher involvement with and support of the students. Educational materials are chosen to match the achievement levels of the participants -- initially materials are below the achievement level of all participants, but they become progressively more difficult until the materials challenge the most able in the group. Individual student needs are diagnosed, goals and criteria are clearly articulated, individual student progress and performance are continuously assessed, and students are actively involved in the process of setting and monitoring goal attainment so as to foster a sense of self-responsibility. Structured exercises provide each student with the opportunity to identify "stoppers" -- impediments to learning and achieving -- and to discover how they can be overcome. At the end of the course each student reviews his progress and makes commitments to future goals in the form of a letter to himself that is mailed to him three months after the end of the course, and in a letter to his parents. Many

of the materials are presented in the form of innovative educational games and group exercises that cater to the interests of the participants in order to maintain a high level of enthusiasm and interest and to emphasize the practical relevance of the academic skills. Some of the outdoor physical activities from the traditional Outward Bound standard course are also included in the Bridging Course, but the primary focus is on an integrated approach to academic growth.

Five Bridging courses, one a year during the 1980-1984 period, were conducted at high schools located in different parts of Australia. Potential students for each course were identified from among the poorest achieving males in single school. From this group were selected those who appeared to be capable of achieving at a higher level, who had strong parental support for their participation in the program, and who exhibited no extreme behavioral problems. The selection was based on information from school records, teacher recommendations, standardized tests, and parent interviews. During the evolution of the Bridging course increasing levels of parental involvement were sought, and were fostered by the selection of schools where parental concern with academic performance appeared to be strong. Particularly in the last two years, the Outward Bound philosophy was explained to parents in detail, their active support was sought, they were told to expect changes in their son's academic performance and self-concept, they were given suggestions as to how they might reinforce these changes, and they were given periodic feedback of their son's progress during the course. At the end of the program their son wrote them a letter in which he outlined his future goals, discussed the "stoppers" that might impede his progress, and indicated how they could support his progress. In this way the parents became active participants in the intervention and were better able to reinforce the transfer of expected changes in self-concept and achievement back to the their son's old environment after the end of the course.

Self-concept.

Multiple Dimensions. The enhancement of self-concept is widely valued as a desirable educational goal, and is frequently posited as an intervening process that may lead to improved academic performance. However, systematic reviews of self-concept research emphasize poor theoretical models, poor quality of instruments used to assess self-concept, and methodological shortcomings (e.g., Burns, 1979; Scheirer & Kraut, 1979; Shavelson, Hubner & Stanton, 1976; Marsh & Shavelson, 1985; Wells & Marwell, 1976; Wylie, 1974;

1979). In an attempt to remedy some of these problems, Shavelson et al. (1976) posited a multifaceted, hierarchical model of self-concept on the basis of his review of theoretical and empirical research. While the multidimensionality of self-concept -- and the particular facets posited by Shavelson -- have not been universally accepted, the assumption has received strong support in a review of research stimulated by the Shavelson model (Marsh & Shavelson, 1985), in research with the Self Description Questionnaires (SDQ) that are based on the Shavelson model (e.g., Marsh, 1984; Marsh, Barnes, Cairns & Tidman, 1984; Marsh & Hocevar, 1985; Marsh, Parker & Barnes, 1985; Marsh, Smith, Barnes & Butler, 1983), and by findings of other researchers (Boersma & Chapman, 1979; Dusek & Flaherty, 1981; Fleming & Courtney, 1984; Harter, 1982; Soares & Soares, 1982; see review by Byrne, 1984). In their review Marsh and Shavelson contended that the relationship between self-concept and other constructs cannot be understood if this multidimensionality is ignored. Similarly, Byrne (1984), in a review of construct validity issues in self-concept research, demonstrated that academic dimensions of self-concept could be clearly distinguished from nonacademic and general components of the construct, and that these academic facets were more strongly related to academic performance indicators than were other facets.

Stability and Change in Self-concept. Self-concept researchers argue that self-concept should be relatively stable over time, but much interest in self-concept -- particularly in intervention studies -- stems from the attempt to change self-concept (see Marsh, Richards & Barnes, 1986; in press; Marsh, Smith Barnes & Butler, 1983). Well-controlled interventions have not systematically affected self-concept, despite many possible biases that would be expected to produce changes in self-concept responses (e.g., placebo effects, acquiescence to the experimenter, post-group-euphoria, etc.) Scheirer and Kraut (1979; also see Byrne, 1984) reviewed academic intervention studies that attempted to improve self-concept as a means to improving academic achievement. They found predominantly null results in that most of the interventions failed to alter either self-concept or academic achievement, but they also found that the few studies that did produce positive effects had systematic parental involvement so that parents expected and supported better academic performance by their children. Wylie (1979) reviewed studies of the effects of psychotherapy and growth-producing group experiences on self-concept, and also found predominantly null results. Marsh, Richards and Barnes (1986; in press) suggest two possible

reasons for this lack of success (see Scheirer & Kraut, 1979; Wylie, 1979 for other reasons). First, most research is based on ill-defined measures of self-concept rather than on multidimensional measures for which some of the dimensions are specifically relevant to the goals of the program. Second, the size of the effect is typically small relative to probable error because the intervention is weak or because a potentially powerful intervention is administered to only a few subjects.

Marsh, Richards and Barnes (1986; in press) examined methodological issues in the study of intervention effects on multidimensional self-concepts. They identified what they called a post-group-euphoria effect -- the good feelings that subjects have after the completion of intensive group experiences. They did not question that such an effect existed, but were concerned that its existence affected measures designed to assess the effect of the intervention -- particularly self-concept measures. They argued that randomly assigned control groups provide little protection against such a bias, while placebo controls that are like the program yet are unrelated to the intended effects of the program are unlikely to exist or may not be feasible. Instead, they presented a construct validity approach to the study of intervention effects and of the validity of interpretations resulting from such studies. Using this approach, they argued that specific dimensions of self-concept that are most relevant to the intervention should be most affected, while less relevant dimensions should be less affected and serve as a control for response biases. They conducted a short multiple time-series design in which 26 different groups of participants in different Outward Bound standard courses completed the SDQ one month before the start of the course, on the first day of the course, on the last day of the course, and 18 months after the completion of the course. The findings demonstrated that: there was little systematic change in self-concepts during the control interval (T1/T2); changes during the experimental interval (T2/T3) were large for those facets of self-concept judged a priori to be most relevant to the goals of the program; changes in dimensions of self-concept less relevant to the program were significantly smaller; these intervention effects did not vary substantially in the 26 different groups that were tested; and there was little change in any of the areas of self-concept during the 18-month followup (T3/T4) period. They argued that this design, and the many tests of the validity of their interpretations, provided a stronger test of the program effects on self-concept than did most traditional experimental designs.

The Present Investigation.

The present investigation is similar to the study by Marsh, Richards and Barnes (1986; in press) in that: a) it looks at the effect of a course run by Outward Bound on multiple dimensions of self-concept as measured by the SDQ; b) a short multiple time series design is used; c) the generality of effects is examined across different course offerings of the same (or a similar) program; and d) a construct validity approach is used to assess the validity of the findings. The study differs in that: a) the primary focus of the Bridging Course is on educational objectives rather than the nonacademic goals of the standard course; b) subjects are 13-16 year old low achieving males rather than self-selected 17-25 year olds; and c) the academic nature of the present intervention makes it possible to assess the intervention effects with objective achievement tests as well as with multiple dimensions of self-concept. The juxtaposition of the two studies is particularly important. The earlier study predicted and found significantly more change in nonacademic than academic areas of self-concepts because nonacademic areas of self-concept were more relevant to the standard course. In contrast, because of the academic aims of the Bridging Course, the predictions for the present investigation are that there will be significantly greater change in the academic than nonacademic areas of self-concept.

Methods

Sample and Design.

Subjects consisted of 66 high school males, nearly all ninth grade students aged 13 to 16, who participated in one of the five Outward Bound Bridging Courses conducted annually between 1980 and 1984. The three high schools participating in the program were a state (public) school from North Queensland (1980), a catholic school in metropolitan Sydney (1981, 1982) and an independent (private) school on the south coast of Queensland (1983, 1984). In each course: a) Outward Bound was invited to conduct the program by the school personnel; b) the school identified low-achieving males who appeared to have the potential for better academic performance on the basis of test scores, school records and teacher interviews; c) a final group of 11 - 16 of these students was selected primarily on the basis of the strength of their parents' commitment to the program and its goals (the low-achieving students identified by the school who were not finally selected did not differ systematically from those who were selected in terms of school performance or academic test performance). The average performance of

participants in reading and mathematics was 3-4 years behind their age level, and comparisons with available norms suggest that they might be low in terms of academic and nonacademic self-concepts.[1] During the first three years of the study, students tended to be from lower and lower-middle socioeconomic classes, many were migrants, and since the program was subsidized by government the fees for participation in the program were modest (about $120, including room and board for six weeks). During the last two years of the study, students were from primarily upper-middle class families that were upwardly mobile, and the fees were higher (about $420).

The design of the evaluation component of this study evolved during this five-year period. In 1980, the first year the course was offered, a standardized reading test was administered at the start and at the end of the course. In 1981 the course was evaluated with standardized tests of reading and mathematics, and the Coopersmith (1967) Self Esteem Instrument (SEI), at the start and at the end of the course. In 1982, 1983, and 1984 all participants completed the SDQ, the SEI and the same standardized tests of mathematics and reading achievement approximately six weeks before the start of the course, on the first day of the course, and again at the end of the course. For purposes of this study, the three testing occasions are called Times 1, 2 and 3, even though there were no Time 1 scores for the 1980 and 1981 courses. No randomly assigned control group or comparison group was considered in this study because: a) the participants, because of the selection process and the prerequisite level of parental support, were sufficiently unique that no comparable group of students existed in the same school; b) when nonparticipating students were asked to complete the extensive battery of measures on each of three occasions during a 12-week period in 1982 the request met with resistance, even hostility, and noncompliance; and c) there was an ethical reluctance to draw attention to the low-achieving males who were not selected for the study since it might have created the appearance that they were just too hopeless to be included in the program.

Measures.

Reading Achievement. Reading achievement levels were assessed with both forms of the GAPADOL (McLeod, 1972), a modified cloze-type test on which students are required to fill in the gaps that appear in different passages. McLeod states that the GAPADOL is relatively free from practice effects, that cloze-type tests correlate with other types of reading tests close to the limits of the tests' reliabilities, and that both forms have reliabilities of

about .9. Marsh and Butler (1984), using a version of the test designed for younger students called the GAP, reported that the test correlated .82 with the total score from the Stanford Diagnostic Reading Test (Karlsen, Madden, and Gardner, 1966), and that it was slightly more highly correlated with teacher ratings of reading ability than was the Stanford test. For purposes of the present study, the GAPADOL score is represented as the total of both forms after scores from each had been translated into age-equivalent scores from information provided in the test Manual.[2]

Mathematics Achievement. Mathematics achievement was tested with the Moreton Mathematics Test -- Level III (Andrews, Elkin & Cochrane, 1972). The test consists of 30 problems involving both computation and story problems. The authors report an internal consistency estimate of .76. For purposes of the present study, the Moreton score was translated into an age-equivalent score from information provided in the test manual. However, since the test was normed for students in grades 5 - 7, the highest possible age-equivalency score was 13 years and 10 months. Nevertheless, none of the participants approached this ceiling before the start of the course and only two obtained the score after completion of the course. While the test was at an appropriate difficulty level for students in this study, the inferred age-equivalencies should be interpreted cautiously.

Coopersmith SEI. The SEI (Coopersmith, 1967) was selected because it was one of the most frequently used self-concept instruments in Australia at the start of this study and because it apparently measured separate peer/social, home/parent, and academic components in addition to the general-self scale (see Edgar, Powell, Watkins, Moore & Zakharov, 1974). However, Marsh and Smith (1982) subsequently found no support for the separation of the various subscales on the basis of factor analyses and multitrait-multimethod analyses (MTMM) and these conclusions are generally consistent with the Shavelson et al. (1976) review of the instrument and with Coopersmith's (1967) own findings that led him to question the distinctiveness of the scales and to conclude that self-concept (as measured by his instrument) was not multidimensional. For purposes of this study scores for each scale are the number of dichotomously scored items to which subjects responded in the direction of a higher self-concept. Thus scores for each scale vary from 0 to the number of items comprising the scale: academic (8), social (8), home (8), general (26), and total score (50).

Self Description Questionnaire (SDQ). The SDQ measures seven facets of self (General School, Reading, Math, Physical Ability, Appearance, Peer

Relationships, Parent Relationships) derived from the Shavelson et al. (1976) multifaceted, hierarchical model of self-concept. The scales are internally consistent (mean r = .88), moderately stable over a six month interval (mean r = .65), and quite distinct as demonstrated in numerous factor analyses and MTMM analyses (e.g., Marsh, Barnes, Cairns & Tidman, 1984; Marsh, Smith and Barnes, 1983; Marsh, Smith, Barnes, & Butler, 1983; see Marsh, in press, for a summary). Research described earlier provides particularly good support for the ability of the SDQ to differentiate among different components of academic self-concept (also see Marsh & Shavelson, 1985; Byrne, 1984). For purposes of this study, scores representing each of the seven scales consist of the unweighted average of responses to the 9 or 10 items that comprise each scale after responses to negatively worded items were reverse-scored. Total academic and nonacademic scores consisted of the average of the three academic and of the four nonacademic scales. All scores vary on the 1 - 5 response scale used to respond to each item and higher scores refer to more favorable self-concepts.

Statistical Analysis.

Because of the nature of this study, there are few missing scores for any of the measures that were administered. In 1982 two students did not complete the program (one due to medical reasons and one was asked to leave because of disciplinary reasons), and so they had no Time 3 scores. Five other students failed to complete one administration of either the SEI or SDQ, but there were no other missing values for either of the achievement tests. The first analysis of the stability and validity of the measures is based on a correlation matrix determined with pairwise-deletion of missing data (see Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). In the second set of analyses mean responses were compared from Times 1, 2 and 3. For purposes of this analysis, missing Time 2 responses were replaced with Time 1 responses, missing Time 1 responses were replaced with Time 2 responses, and the missing Time 3 responses for the two boys who did not complete the program were replaced with their Time 2 responses (since intervention effects are assessed on the basis of the difference between Time 2 and Time 3 responses this procedure produces a result of "no effect" for these two subjects and is more conservative than eliminating these students from further consideration).

Results

Stability and Validity of the Measures.

Because of the special nature of the students in this study, it is important to establish the stability and validity of the measures. The 43

students in the 1982, 1983 and 1984 courses completed each of the measures on two occasions before the start of the intervention, and the correlations among these measures are presented in the form of a MTMM matrix (Table 1). In MTMM analyses the same construct is measured with two or more methods; convergence refers to agreement between the same construct assessed by different methods, and divergence refers to the distinctiveness of the multiple traits. MTMM-like analyses have been applied in situations when the "different" methods are really quite similar (two different testing occasions), are moderately different (two different instruments), and even refer to distinct constructs (self-concept and academic achievement). Nevertheless, the logic of MTMM analyses and the criteria developed by Campbell and Fiske (1959) can be applied in each situation, and it is argued elsewhere (see Marsh, Barnes & Hocevar, 1985; Marsh, Smith, Barnes & Butler, 1983) that it is better to consider more than one type of method difference in the same study. For purposes of discussion, convergence and related evidence for the distinctiveness of the measures will be examined separately in relation to stability coefficients for each measure, to correlations between matching traits from the two self-concept instruments, and to correlations between self-concept measures and achievement test scores.

Insert Table 1 About Here

Stability of the SDQ Scales. For purposes of this analysis the MTMM matrix consists of the 14 x 14 correlation matrix relating the seven SDQ scales administered at Time 1 to those from Time 2, and the convergent coefficients are the stability coefficients (underlined in Table 1). In the application of the four Campbell-Fiske criteria:

1) The seven stability coefficients (mn r = .69) are all substantial, and only the stability of the Peers scale is less than .68. Hence there is good support for stability over this six week interval.

2) Each stability coefficient (mn r = .69) is higher than other correlations in the same row and column of the square submatrix relating Time 1 and Time 2 measures (mn r = .18) for 83.5 of 84 comparisons (one comparison resulted in a tie).

3) Each stability coefficient (mn r = .69) is higher than correlations among the different SDQ scales at Time 1 (mn r = .23) and at Time 2 (mn r = .23) for 81 of 84 comparisons.

4) The pattern of correlations between the SDQ scales is similar at Time 1 and Time 2. On each occasion the highest correlation is between Math and School self-concepts, while the correlation between Math and Reading

self-concepts is not statistically significant.

These results provide good evidence for the stability of the SDQ scales over the six week control interval, and for the distinctiveness of the different scales.

Stability of the SEI Scales. For purposes of this analysis the MTMM consists of the 8 x 8 correlation matrix relating the four SEI scales administered at Time 1 to those from Time 2. However, in the application of the first Campbell-Fiske criterion only two of the four stability coefficients (mn r = .39) are statistically significant, and only the stability of the General scale is greater than .42. This lack of support for the convergence of the scales over time makes problematic the application of the other criteria. Inspection of the correlations suggests that the General scale is the only one to consistently pass the other Campbell-Fiske criteria. These results suggest that the specific subscales of the SEI are not sufficiently stable and distinct to be interpreted separately from the total score that reflects a general dimension of self.

Stability of the Achievement Scores. The stability coefficients for both the reading (.85) and mathematics (.70) achievement tests are substantial, while the four correlations between the two tests (mn r = .42) each fall between .40 and .46. Thus, while reading and mathematics achievement are moderately correlated, they are also distinguishable components of academic achievement.

SDQ/SEI Agreement. Correlations between the 7 SDQ and 4 SEI scales appear in four 7 x 4 rectangular submatrices in Table 1(i.e., Time 1 SDQ scales and Time 1 SEI scales, Time 1 SDQ scales and Time 2 SEI scales, etc.) Since the two self-concept instruments do not measure the same traits, the Campbell-Fiske criteria cannot be applied literally. Nevertheless, several of the scales from the two instruments do seem to measure similar constructs: the Academic scale from the SEI and the three academic scales from the SDQ; the Social (SEI) and Peer (SDQ) scales; and the Home (SEI) and Parents (SDQ) scales. Applying the Campbell-Fiske logic, each of these correlations (underlined in Table 1) should be higher than the other correlations in the same row and column of the 7 x 4 submatrix where it appears. Convergent validities relating the Home (SEI) and Parents (SDQ) scales (mn r = .53) pass this test for all 28 comparisons, while convergent validities relating the Social (SEI) and Peers (SDQ) scales (mn r = .50) satisfy 27 of 28 comparisons. Thus, this analysis provides support for the convergent and discriminant validity of the Home/Parents and Social/Peer

scales from the two instruments. There is little support for the convergence of the SEI Academic scales and the three SDQ academic scales, and only 2 of these 12 correlations even reach statistical significance.

Self-concept/Academic Achievement Correlations. Correlations between the achievement tests and the SEI scales generally do not reach statistical significance, and only 2 of the 8 correlations relating the Academic scale to achievement (mean r = .15) are significant.

The correlations between the achievement test scores and SDQ scales demonstrated a systematic pattern of relations. Reading achievement scores are all significantly correlated with each Reading self-concept score (mn r = .43). Similarly, mathematics achievement scores are all significantly correlated with each Math self-concept score (Mn r = .40). The general School self-concept scores are less highly correlated with the achievement test scores, though correlations with mathematics achievement (mn r = .34) are higher than with reading achievement (mn r = .16). Correlations between reading achievement and Math self-concepts (mn r = .03) and between mathematics achievement and Reading self-concepts (mn r = .00) are all close to zero. Only 2 of the 32 correlations relating nonacademic self-concepts to the achievement scores (mn r = .10) even reach statistical significance. Hence, academic achievement in reading and mathematics is significantly correlated with the academic self-concept in the same area, less correlated with other areas of academic self-concept, and not significantly correlated with nonacademic areas of self-concept.

Summary of Stability and Validity Analyses. The results for the SDQ scales provide good support for their stability over time, and for the systematic pattern of relationships with academic achievement in reading and mathematics. In contrast, the results suggest that the SEI scales are not stable over time and are not significantly related to achievement in reading or mathematics. Surprisingly, support for the convergent and divergent validity of the Social and Home scales of the SEI was better when related to the SDQ scales than when related to two administrations of the SEI. While this does provide some support for these two scales from the SEI, it is probably explicable in terms of the superior performance of the SDQ.

The specificity of the relations between Reading and Math self-concepts and the corresponding areas of academic achievement is consistent with a large number of SDQ studies conducted at a wide variety of age levels (Marsh, 1986). The lack of correlation between Reading and Math self-concepts, despite the substantial correlation between achievement scores in

these two areas, argues that the self-concepts are more than a mere reflection of academic achievement and that additional psychological processes must affect their formation. The strength of the support in this study is particularly compelling since the range of academic achievements for these students is so truncated, the nature of the sample would make it likely that additional factors would complicate the pattern of relations, and the findings are consistent across all combinations of the measures administered at Times 1 and 2.

The Effects of the Bridging Course Intervention.

The Bridging course is expected to enhance reading and mathematics achievement, and to enhance the corresponding areas of academic self-concept. While its effects on nonacademic areas of self-concept are likely to be smaller and less predictable on an a priori basis, the program is intended to affect self-concepts in nonacademic areas as well. In particular, the substantial commitment made by parents suggests that effects on the Home (SEI) and Parents (SDQ) scales in particular might be positive. The intensive involvement that the boys have with each other and with Outward Bound staff during the six weeks suggests that the effect on the Social (SEI) and Peer (SDQ) scales might be significant. The nature of the outdoor activities that the boys partake of in addition to the academic components suggests that the effects on the Physical (SDQ) scale might be significant. Nevertheless, it is predicted that the intervention will affect academic areas of self-concept more than nonacademic areas.

The study uses a short multiple time series: measures were administered about six weeks before the start of the course (Time 1), on the first day of the course (Time 2), and on the last day of the course (Time 3). Neither academic achievement nor self-concept are likely to change systematically in such a short period without any intervention, and Marsh, Richards and Barnes (1986; in press) found little systematic change in self-concept during the control interval (T1/T2) for the Outward Bound standard course. Hence, the change in the T2/T3 experimental interval is expected to be substantial, statistically significant, significantly more positive than corresponding changes in the control interval, and significantly larger for academic than for nonacademic facets of self-concept.

The mean for all measures is presented for Times 1, 2 and 3 separately for each course and averaged across all courses (Table 2), along with a summary of effect sizes for changes over the T1/T2 control interval and the T2/T3 experimental interval. For the 1980 course, only the reading

achievement test was administered and only at Times 2 and 3; the results indicate that a large change in reading levels of almost two years took place during the experimental interval. For the 1981 course, the mathematics achievement test and the SEI were added, but again no Time 1 measures were collected. Gains in reading and math achievement were almost one year and there were also improvements in the Home and particularly in the Academic scales of the SEI. These findings clearly support the effectiveness of the Outward Bound intervention, but the lack of a Time 1 measure and the SEI's apparently dubious ability to differentiate among different components of self-concept leave these substantial effects liable to alternative explanations.

Insert Table 2 About Here

For the 1982, 1983 and 1984 courses both achievement tests, as well as the SEI and the SDQ, were administered at Times 1, 2, and 3. In each year there were substantial gains in both the achievement tests during the experimental (T2/T3) interval that amounted to between .5 and 1.25 years in performance. Changes over this experimental interval were also consistently substantial on the Total Academic score from the SDQ and on each of the academic subscales that comprise this total, while changes on the Total Nonacademic score and the nonacademic subscales were smaller. Changes during the experimental interval for the SEI were substantial for at least one scale each year, but none of the scales nor their total was consistently large for all three years.

For the 1982, 1983 and 1984 courses, unlike the earlier courses, there was also a T1/T2 control interval. For 1982, there were no substantial changes on any of the self-concept or achievement scores during the control interval. In 1984, there were significant changes in reading achievement and the Academic (SEI) scale, but not on any of the other measures. However, in 1983, there were significant changes in both achievement measures, in all the academic scales from both self-concept instruments, and in the Home/Parents scales from both instruments. The significant shifts during the control interval complicate the interpretation of the results, but they are consistent with the intention to create a placebo-like effect before the start of the program as suggested by McClelland (1965) and the implications of these finding are discussed later.

It was also predicted that shifts during the experimental interval would be significantly larger than shifts in the control interval, and that the difference would be larger in academic areas (though significant shifts in the

academic measures observed in the control interval complicate this comparison). A series of repeated measures ANOVAs were conducted with the commercially available MANOVA routine from SPSS (Hull & Nie, 1981) on the 1982, 1983 and 1984 scores to test this prediction. For each student shifts (i.e., difference scores) during the control interval were compared with those for the experimental interval for the seven SDQ scales, for the two SDQ total scores, for the three SDQ academic scales, for the four SDQ nonacademic scales, for the 4 SEI scales, and for the two achievement tests (see Table 3).

Insert Table 3 About Here

The first analysis consisted of a 2 (control vs. experimental interval) by 7 (SDQ scales) by 3 (1982, 1983 & 1984) ANOVA where the first two factors were within-subject or repeated measures factors. In support for the predictions the effect of interval is statistically significant but the effect of the interval varies with the self-concept scale. Subsequent analyses were conducted to further examine the findings. Analyses of the two SDQ total scores demonstrate that interval effect is larger for the academic than for the nonacademic component. Analysis of the four nonacademic scales indicates no significant difference in shifts during the control and experimental intervals for any of these scales. Analyses of the three academic scales indicated a large interval effect that varies somewhat with the area of academic self-concept (inspection of Table 2 indicates that the positive shift in Reading self-concept is somewhat larger during the control interval and smaller during the experimental interval than for Math and School self-concepts). In a similar analysis of the four SEI scales, the effect of interval was statistically significant but did not vary significantly for the different scales, thus supporting the earlier finding that the different SEI scales are not very distinguishable. Since the interval-by-year and interval-by-scale-by-year interactions are not statistically significant for any of these analyses, the results are reasonably consistent across the three years when the short time series was employed. These findings provide strong support for the self-concept predictions based on the SDQ, some support for predictions based on the SEI, and support for the generality of the findings.

In an analysis of the two achievement tests (Table 3) the effect of interval is statistically significant and does not vary with the year of the study. The lack of interval-by-scale interaction suggests that the difference between control and experimental intervals is similar for mathematics and reading achievement scores. In a final analysis (not shown)

the mathematics and verbal achievement scores and the Math and Reading self-concept scores were considered together. Again, the shifts in the experimental interval were substantially larger than in the control interval ($p < .001$), but this difference did not vary significantly with the academic content area (verbal vs. mathematics), the type of measure (self-concept vs. academic achievement), the year of the study, nor any combination of these variables (all ps > .1). These results provide strong support for the academic achievement predictions, and suggest that the results are similar for achievement and self-concept in mathematics and verbal areas.

Summary and Discussion

The findings provide strong support for: a) the effectiveness of the Outward Bound Bridging course coupled with parental support as an academic intervention for low-achieving high school males that is effective with respect to both academic achievement and academic self-concept; b) the multidimensionality of self-concept; c) the validity of responses to the SDQ in relation to academic achievement and, perhaps, in relation to the SEI, and d) the effectiveness of the SDQ as a measure that validly reflects the effect of a powerful academic intervention. Support for the validity of responses to the SEI, particularly in relation to academic achievement, was more problematic, but self-concept as assessed by this measure also improved as a consequence of the Bridging course.

The size and specificity of the effects observed in the control interval -- primarily in 1983 but to a lesser extent in 1984 -- require further consideration. As recommended by McClelland (1965), at Time 1 we specifically sought to engender a belief in students and their parents that the Bridging Course would affect academic self-concept and achievement. The significant shifts during the control interval suggest that this strategy was effective. It is also important to note that both the 1983 and 1984 courses were conducted with students from the same high school where parental support was very high, while the 1982 course -- where there was no evidence of any systematic shift in either achievement or self-concept during the control interval -- was conducted for a different school where students' enthusiasm and parents' involvement was not so strong. The support of the school personnel was also stronger in 1983 and 1984 than in 1982. School personnel and particularly the parents believed that the intervention would work, and there was pressure on the Outward Bound Director to accept additional students into the program, resulting in the size of the course being increased in 1983 and again in 1984. Thus, the

students who were accepted, and their parents, were a "selected" group that was highly motivated to succeed -- and very susceptible to "placebo" effects. Had the study been limited to a general measure of self-concept, the results for the control may have been dismissed as a "simple" placebo effect and may have served to undermine support for subsequent results from the experimental interval. However, the finding that there were significant increases in both areas of achievement--particularly reading, and the further finding that changes in self-concept were almost exclusively limited to the academic and the Home/Parent scales provides support for a very different interpretation. Instead of being an undesirable bias in the results, the placebo effect observed here is a valid effect as indicated by: its generality over cognitive and affective components of academic achievement, and the fact that the initial enhancement was maintained and accelerated during the experimental phase of the study. Critelli and Neumann (1984) also take the position that the negative connotation placed on placebo effects is often undeserved and that placebos can have real, empirically demonstrable, desirable effects that support the aims of the intervention. Apparently, this is an example of an intervention intentionally taking advantage of a placebo effect, and making it work to the advantage of the program goals. From this perspective, perhaps, the placebo effect should be considered as a legitimate intervention effect rather than something that needs to be controlled in assessing the intervention effect as was done in the comparison between control and experimental intervals. These findings also support McClelland's contention that the belief that a change will occur is a powerful source of change.

A host of alternative explanations exist that could explain each of the separate effects of the study, but we find none that is plausible in explaining the total pattern of results. Changes in self-concept responses could be explained in terms of a variety of biases conceptually related to the post-group-euphoria effect discussed earlier, but such an explanation seems unlikely to account for the specificity of the changes in different areas of self-concept and particularly for the changes in academic achievement. The achievement effects could be explained as practice effects since the same tests were used, but: a) achievement tests were specifically chosen for which practice effects were expected to be small; and b) such an explanation would probably require the T1/T2 shift to be at least as large as the T2/T3 shift and would not explain the effects on academic self-concepts. Normal growth might explain some of the achievement effects, but

not the size of the shift, nor the differential shift in the experimental and control intervals, and not the shifts in academic self-concept. Regression effects might explain the direction of the achievement shifts, and perhaps even the self-concept shifts. However, the size of regression effects on all variables should be small since the variables were reliable and since the low-achieving students were identified on the basis of accumulated school performance rather than any of the measures actually used in the study. Furthermore, the regression effects should be as large or larger during the control interval as during the experimental interval, and should affect both nonacademic and academic areas of self-concept. A variety of time/location specific biases that are associated with time-series designs are not viable since the effects were similar in each of the three different courses (see Cook & Campbell, 1979). Hence, a variety of internal and external threats to the validity of our interpretations of the effects do not appear to be plausible.

The results of the present investigation also complement those reported by Marsh, Richards and Barnes (1986; in press). In both studies Outward Bound courses, albeit different kinds of courses, were found to enhance those self-concepts that were most specific to the aims of the respective courses, and to have significantly less effect on other facets of self-concept. In the earlier study the aims of the intervention were specifically nonacademic, and the changes in the academic scales served as a control against which to evaluate facets that were more relevant. In contrast, this study focused on academic criteria and it was the nonacademic facets of self-concept that served as a control for the academic facets. The present study also differed in that changes in academic achievement provided an objective basis for assessing intervention effects, and validating changes that took place in academic self-concepts. Taken together, the two studies provide stronger support for the specificity of the effects of each of the interventions than was possible in considering either one in isolation.

The present investigation is one of the few studies to find that a systematic intervention designed to enhance both academic achievement and academic self-concept was successful (see Scheirer & Kraut, 1979). We suspect that the critical features of the present study that led to its success were: a) a particularly powerful intervention which was conducted outside the school environment where old self-concepts and behavior patterns would be reinforced; b) instilling expectations that changes would occur

before the start of the intervention; c) the strong parental support for the program and their expectations that the program would be successful; and d) the use of a multidimensional self-concept scale that validly measured areas of academic self-concept that were specific to the intervention's goals and differentiated these from other areas of self-concept. The only other research known to us where an intervention had significant effects on both academic self-concept and academic achievement for adolescent students was that conducted by Brookover (see Brookover & Erikson, 1975; Scheirer & Kraut, 1979; for summaries). The design of the Brookover study is different from the present study in that it contained randomly assigned control and placebo subjects, and his intervention was also quite different. However, it is important to note that the four characteristics identified above were also present in the Brookover research.

The results of the study leave unanswered the important theoretical question of the causal ordering of the self-concept and academic achievement effects. In an interpretation of their earlier research, Brookover and Erikson (1975) argue that changing the expectations and reinforcement patterns of significant others, particularly parents, will lead to a change in academic self-concept that will influence academic achievement. While agreeing with their position, we also feel that changes in academic achievement will be reflected in subsequent changes in academic self-concept, and that changes in academic self-concept that are not supported by subsequent changes in achievement will be difficult to maintain. Like the Brookover study, our intervention was specifically designed to enhance both academic achievement and academic self-concepts, and the results showed that both were affected. Consistent with the design of the intervention, we choose to interpret these findings as support for a model of reciprocal causal effects between academic self-concept and academic achievement such that changes in one will facilitate changes in the other. From this perspective, the attempt to establish the causal priority of either academic self-concept or academic achievement may be counter-productive. To the extent that an intervention that is designed to influence both academic achievement and academic self-concept is more effective than one that focuses on only one, then it may not matter which is causally predominant.

Footnotes

1 -- Because of its simplified language, the version of the SDQ chosen for this study is the one typically used for students in grades 4 - 6, rather than the one for high school students. Using norms for males from grades 5 and 6, students in the present study were .78 standard deviations below average in total academic self-concept and .63 standard deviations below average in total nonacademic self-concept. However, using the high school version of the SDQ, Marsh, Parker and Barnes (1895) found a drop in self-concept -- in both academic and nonacademic areas -- of about .3 standard deviations between grades 7 and 9, followed by a subsequent increase through the remaining high school years. Consequently, the conclusion that students in the present study are below average in self-concept must be interpreted cautiously. A similar problem exists in the interpretation of age-equivalency scores for the mathematics achievement test that was normed on students younger than those considered in this research.

2 -- For Time 1 of the 1982 course, only one form of the GAPADOL test was administered. A regression analysis was used to predict the average of both scores from this one form for all other cases where both forms were available in Time 1 or 2, and this was used to predict the average score on the basis of the one form. This procedure was used because, at least for students in this study, there were systematic differences in the mean (but not standard deviation) of scores from the two forms. In all other cases both forms were administered on each testing occasion, and the average of the two forms was used.

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Table 1

Correlations Between Self-concept Scales and Achievement Scores For Times 1 and 2

	SDQ Time 1							SDQ Time 2							SEI Time 1				SEI Time 2				Achievemer			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	2
SDQ Time 1																										
1 Schl	---																									
2 Read	34	---																								
3 Math	72	7	---																							
4 Phys	03	9-10	---																							
5 Appr	24	18	-1	45	---																					
6 Peer	28	19	40	22	29	---																				
7 Prnt	20	40	12	31	13	24	---																			
SDQ Time 2																										
8 Schl	69	27	54	12	23	36	11	---																		
9 Read	19	76	3	31	6	29	53	24	---																	
10 Math	69	17	85	10	8	41	14	80	17	---																
11 Phys	01	6-15	73	37	12	31		10	31	01	---															
12 Appr	15	06	07	44	68	05	19	19	01	17	56	---														
13 Peer	-01	04-14	41	41	45	12		11	15	02	54	35	---													
14 Prnt	-06	32-04	23-09	15	69			-06	56	05	35	01	18	---												
SEI Time 1																										
15 Acad	50	45	17	27	45	6	9	23	19	22	22	38	17	7	---											
16 Soc	24	19	39	35	50	56	40	47	16	51	34	39	53	09	41	---										
17 Home	61	27	16	20	15	2	79	8	34	14	26	26	9	49	15	43	---									
18 Genl	23	45	40	22	44	42	23	36	30	38	18	30	37	5	64	70	34	---								
SEI Time 2																										
19 Acad	23	13	18	23	-6	19	23	24	27	19	41	15	22	16	22	40	25	32	---							
20 Soc	07-02	05	27	27	30	10		28-07	19	31	31	62	-01		12	42	-03	10	01	---						
21 Home	13	20	12	12-18	13	29		18	35	29	31	03	08	56	07	17	28	11	05	7	---					
22 Genl	38	3	34	28	27	52	2	42	-2	46	23	34	40	-4	49	60	01	62	22	41	29	---				
Achievement Time 1																										
23 Read	22	46	3	11	-3	16	37	7	49	1	10	8	11	19	06	6	31	15	19	14	9	-5	---			
24 Math	46	2	46	13	8	27	21	34	7	38	9	18	13	-7	12	44	33	40	43	21	-1	27	42	---		
Achievement Time 2																										
25 Read	18	33	3	00-07	33	23		16	43	03	12-02	21	07		-06	04	20	11	21	17	12	06	85	40	---	
26 Math	35-07	44	-04-16	27	09			21-01	34	00	06	13	01		-07	21	18	13	33	32	09	25	41	70	46	--

Note: Correlations, presented without decimal points, larger than .29 are statistically significant ($p < .05$). The underlined values are the convergent coefficients, and each is predicted to be higher than any other correlation in the same row and column of the rectangular matrix in which it appears.

Table 2

Means and Standard Deviations For Self-concept and Achievement Scores For Each Year of the Study at Time 1 (T1), Time 2 (T2), and Time 3 (T3)

		1980 (n = 11)		1981 (n = 12)		1982 (n = 12)		1983 (n = 15)		1984 (n = 16)		Total (n= 43)	
		Mn	SD	Mn	SD	Mn	SD	Mn	SD	Mn	SD	Mn	SD
SDQ Scales													
School	T1					2.91	.57	2.74	.81	2.88	.56	2.84	.65
	T2					3.05	.70	3.12	.72	2.96	.74	3.04	.71
	T3					3.50	.78	3.72	.61	3.61	.80	3.62	.72
Effect						2		3		2		3	
Reading	T1					3.22	.78	3.32	1.14	3.82	1.08	3.48	1.04
	T2					3.11	.56	3.93	.98	4.12	.74	3.77	.71
	T3					3.67	.85	4.43	.42	4.24	.92	4.14	.81
Effect						2		3		2		3	
Math	T1					3.04	1.19	2.67	1.05	2.63	1.01	2.76	1.07
	T2					3.04	.92	3.09	1.16	2.73	1.05	2.94	1.05
	T3					3.65	1.05	3.98	.68	3.53	.99	3.71	.92
Effect						2		3		2		3	
Physical	T1					3.61	.71	3.82	.73	4.11	.51	3.87	.67
	T2					3.63	.59	4.06	.44	4.10	.63	3.95	.59
	T3					3.90	.62	4.15	.62	4.23	.58	4.10	.61
Effect												2	
Appear	T1					3.26	.56	2.99	.93	3.33	.77	3.19	.78
	T2					3.38	.35	3.00	.88	3.58	.77	3.32	.75
	T3					3.63	.47	3.24	.91	3.72	.64	3.53	.72
Effect						2						2	
Peers	T1					3.04	1.19	3.81	.88	3.48	.78	3.48	.97
	T2					3.35	.76	4.00	.65	3.69	.93	3.70	.82
	T3					3.68	.79	3.95	.77	3.84	.71	3.83	.74
Effect						2						2	
Parents	T1					3.98	.60	4.03	1.05	4.48	.50	4.19	.78
	T2					3.95	.74	4.54	.49	4.44	.62	4.34	.65
	T3					4.27	.61	4.66	.43	4.65	.33	4.54	.48
Effect						2		3		2		3	
Total	T1					3.06	.65	2.91	.84	3.11	.58	3.02	.69
Academic	T2					3.07	.60	3.38	.78	3.27	.65	3.25	.68
	T3					3.61	.77	4.04	.45	3.79	.73	3.82	.67
Effect						2		3		2		3	
Total	T1					3.48	.36	3.67	.68	3.85	.47	3.68	.54
Non	T2					3.58	.36	3.90	.41	3.95	.60	3.83	.50
academic	T3					3.87	.37	4.00	.50	4.11	.41	4.00	.43
Effect						2						3	

Table 2 (continued)

	1980 (n = 11)		1981 (n = 12)		1982 (n = 12)		1983 (n = 15)		1984 (n = 16)		Total (n=43-66)	
	Mn	SD	Mn	SD	Mn	SD	Mn	SD	Mn	SD	Mn	SD
SEI Scales												
Academic T1					4.08	1.62	2.33	1.67	2.94	1.77	3.05	1.80
T2			3.42	1.68	3.75	1.82	3.73	1.39	4.63	1.99	3.93	1.75
T3			5.83	1.74	3.75	1.35	5.60	2.02	5.56	1.46	5.24	1.82
Effect			2				3		3		3	
Social T1					5.50	1.93	5.60	2.16	5.63	1.75	5.59	1.91
T2			5.67	1.23	5.50	1.94	6.40	1.50	5.63	1.78	5.82	1.63
T3			6.08	1.68	6.75	1.77	6.80	1.97	6.25	1.61	6.47	1.74
Effect					2						2	
Home T1					5.33	2.23	5.53	2.39	6.69	.87	5.91	1.96
T2			5.00	2.22	4.75	1.60	6.87	1.41	5.94	1.53	5.72	1.84
T3			6.17	1.85	5.42	2.07	7.47	.83	7.00	1.21	6.60	1.66
Effect			2				1		2		2	
General T1					18.50	3.42	17.20	5.51	17.69	4.60	17.74	4.58
T2			15.75	4.31	19.00	2.53	19.47	4.45	18.19	3.23	18.18	3.87
T3			16.42	3.53	19.33	3.77	22.00	3.51	21.94	2.65	20.18	3.96
Effect							2		2		3	
Total T1					33.42	5.79	30.67	10.12	32.94	7.36	32.28	7.98
T2			29.83	7.60	33.00	3.62	36.47	6.53	34.38	6.13	33.65	6.45
T3			34.50	6.68	35.25	5.32	41.87	6.86	41.00	5.09	38.56	6.72
Effect							3		2		3	
Achievement Tests												
Reading T1					11.36	2.47	12.38	1.88	14.31	1.81	12.81	2.33
T2	10.08	2.25	11.83	2.99	11.96	2.53	14.32	1.80	14.86	2.05	12.86	2.86
T3	11.98	2.58	12.69	3.29	12.99	2.50	15.67	1.45	16.19	1.12	14.15	2.77
Effect	2		2		2		3		3		3	
Math T1					11.06	1.02	10.96	.83	11.69	1.01	11.26	.99
T2			9.97	1.00	10.90	1.00	11.46	.69	11.79	.99	11.11	1.13
T3			10.99	1.19	11.43	1.52	12.51	.84	12.28	.97	11.87	1.25
Effect			2		2		3		3		2	

Note: The missing entries in 1980 and 1980 correspond to scores that were not collected in those two years.

[a] Changes during the control (T1/T2) and experimental (T2/T3) intervals that are greater than two standard errors are indicated by a 1 when it occurred in the control interval only, 2 when if occurred in the experimental interval only, or a 3 when it occurred in both experimental and control intervals. The large number of comparisons and the small sample sizes makes problematic the interpretation of statistical significance of these comparisons (but see Table 3).

Table 3

Repeated Measures Anovas For Six Sets of Variables

	7 SDQ Scales			2 SDQ Totals			3 SDQ Academic Scales			4 SDQ Non-Academic Scales			4 SEI Scales			2 Achievement Tests		
Source	df	MS	F-ratio	df	MS	F-ratio	df	MS	F-ratio	df	MS	F-ratio	df	MS	F-ratio	df	MS	F-ratio
Between Ss																		
Year (Y)	2	1.10	1.34	2	.40	1.60	3	.39	2.80	2	.04	0.08	2	36.93	3.67*	2	8.31	8.29**
error	40	.82		40	.25		40	.77		40	.46		40	10.06		40	1.00	
Within Ss																		
Scale (S)	6	1.54	7.17**	1	2.40	20.91**	2	.38	2.48	3	1.16	5.40**	3	32.31	10.97**	1	22.17	40.57**
Y x S	12	.40	1.87*	2	.35	3.04	4	1.17	1.17	6	.24	1.09	6	8.37	2.84*	2	.36	.47
error	240	.21		40	.11		80	.16		120	.22		120	2.95		40	.55	
Interval (I)	1	5.66	6.00*	1	2.03	7.14**	1	9.39	9.85**	1	1.71	2.39	1	32.05	4.63*	1	5.62	6.70*
Y x S	2	.67	.71	2	.19	.52	2	.28	.29	2	.03	0.04	2	13.84	2.00	2	1.75	2.08
error	40	.94		40	.28		40	.95		40	.71		40	6.92		40	.84	
I x S	6	1.26	3.17**	1	1.16	5.35**	2	1.57	4.19*	3	.82	2.14	3	6.24	1.03	1	1.18	1.09
Y x I x S	12	.46	1.15	2	.00	.01	4	.65	1.73	6	.29	.76	6	11.06	1.54	2	2.26	2.08
error	240	.40		40	.21		80	.37		120	.38		120	6.07		40	1.09	

* < .05, ** < .01.

Note. The results summarized here were performed on 6 sets of scores. The two levels of the interval factor are the control interval and the experimental interval, and the scales factor refers to the different scales of the self-concept instruments or to the mathematics and reading scores of the achievement tests.